ERGONOMIC KEYBOARD INPUT DEVICE

BACKGROUND AND SUMMARY OF THE INVENTION

The present invention relates to a keyboard input device for transmitting information to a suitably coupled electronic system, such as a digital computer. More particularly, it relates to such a device wherein the keyboard is specially ergonomically designed with reference to the architecture of the human hand in such a fashion that, at least with respect to the fingers on the hand, only slight gestural finger motion is required for effective, multiple, differentiated key actuation.

In recent past years, there has been a dynamic and explosive growth in the use of keyboard devices. This growth, as many know, has been driven largely by the proliferation and ready availability of computer systems for substantially all arenas of society, ranging from business to individual settings. Accompanying this explosion, unhappily, for those who spend many hours using such devices are various annoying and debilitating muscular syndromes that result from repetitive, fatiguing hand, wrist and finger motions that are required in the use of the ubiquitous, conventional typewriter-like keyboards. These syndromes translate not only into pain and discomfort for the affected users, but also into significant loss of productivity—clearly two problems to which corrective attention should be given.

Attention to this problem, generally, is not new in the art, as is evidenced by many serious attempts to alleviate keyboard-use "injuries" through innovative keyboard layouts and architectural designs. Two very good illustrations of approaches taken in the prior art are illustrated in U.S. Pat. Nos. 4,332,493 to Einbinder, and 4,849,732 to Dolenc.

The Einbinder patent discloses a typewriter keyboard in which, not only are keys laid out in a fashion relating to what might be thought of as the "footprint" of the human hand, but also the proposed keys are designed with topographically height- and angle-differentiated actuation pads that tend to minimize, somewhat, overall hand and finger motion during use. However, the Einbinder system still focuses significant attention on the importance of having so-called "home positions" for the finger and thumb tips, from which positions the fingers (and therefore the hands) must travel appreciably in order to perform the usual kinds of typing operations. Thus, the Einbinder approach steps toward, but closes only a portion of the gap in, solving the motion difficulties encountered with conventional keyboards. Put another way, Einbinder does not substantially eliminate these difficulties.

The Dolenc patent illustrates and describes a one-hand key shell which includes fan-like arrays of plural keys distributed in elongate rows and organized for specific actuation by the thumb and four fingers of a hand. Angular and topographical distinctions for individual keys, such as those shown in the Einbinder patent, are not present in the Dolenc system. Dolenc also, apparently, does not establish a "home position" for the tips of the fingers and thumb. Dolenc is concerned with minimizing hand motion, but not particularly finger motion. In fact, Dolenc speaks in terms of organizing keys in the arrays in such a fashion that they take into account the "motion and range of the respective fingers of the hand". Thus, Dolenc clearly contemplates fingertip actuation of each key, and reinforces this concept by teaching that a full equivalent of the push-button keys which he illustrates could take the form of a series of flat-panel touch pads. Accordingly, while Dolenc seriously addresses the issue of minimizing hand motion, his system does not appreciably contribute to minimizing finger motion (and hence related wrist motion).

There are other patents of which I am aware that address, to different degrees, modified keyboard arrangements. These include U.S. Pat. Nos. 2,369,807 to Solon, 4,244,659 to Malt, 4,579,470 to Casey, 4,597,681 to Hodges, and 4,824,268 to Diernisse H.V. None of these latter-mentioned five patents appears to address, at least as pointedly as Einbinder and Dolenc, the issues of keyboard motion "injuries".

Given this known setting in the prior art, and the strong concern about keyboard "motion" problems, it is an important object of the present invention to provide an ergonomic keyboard input device which comprehensively addresses the use-motion injury problem, with focus directed at the entire family of hand-, wrist- and finger-motion issues.

Another object of the invention is provide such a device which accomplishes the above object in a setting where the resulting design fits in close complementary relationship with the underside architecture of the hand, in a manner which requires what is referred to herein as only slight gestural motion of different portions of a user's fingers to effect appropriate key actuation.

The preferred embodiment of the invention which is described herein requires no appreciable hand, wrist or finger motion. More specifically, input use of the proposed device does not require shifting of the hand from a rest position, and does not require wrist rotation for maneuvers that are performed by the four fingers and the thumb. The fingers are not required to start, and then to shift, from conventional "home positions". Rather, instead of focusing on finger-tip key actuation, the keyboard device of the invention is designed to call for only slight gestural motion of different portions of and beneath a person's fingers for actuation of related, facially confronting keys. Thus, and respecting the fingers, different regions adjacent a finger tip are used to actuate different keys, and different regions remote from the finger tips are used to actuate other keys.

Recognizing that a one-size-fits-all approach may not be entirely appropriate to deal with users' hands that are significantly larger or smaller than, say, hands fitting within the "median" of hand sizes, the structure of the invention proposed herein permits positional adjustment of arrays and clusters of keys to accommodate a size-differential concern.

These and other objects attained, and advantages offered, by the present invention will become more fully apparent as the description that now follows is read in conjunction with the accompanying drawings.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a top, front, perspective view illustrating a keyboard input device constructed in accordance with the present invention.

FIG. 2 is a fragmentary, reduced-scale view of the left side of FIG. 1 illustrating the relative position of a user's left hand with respect to the left side of the device of FIG. 1.

FIG. 3 is an enlarged-scale view illustrating a cluster of keys, and the mounting structure provided therefor,